REMARKS

A total of 16 claims remain in the present application.

By way of the above-noted amendments, claim 16 and 18 have been amended to depend on claim 14. Claim 17 has been amended to correct a typographical error introduced in the last response and depends on claim 16 as originally filed.

Referring now to the text of the Office Action:

- claims 1, 3-6, and 10-12 stand rejected under 35 U.S.C. § 103(a), as being unpatentable over the teachings of Kuroyanagi et al (US Patent No. 6,072,610) in view of Fee (US Patent No. 6,108,113);
- claims 7, 8, 13 and 14 stand rejected under 35 U.S.C. § 103(a), as being unpatentable over Kuroyanagi et al (US Patent No. 6,072,610) in view of Fee (US Patent No. 6,108,113) and further in view of Yin et al (US Patent No. 6,246,747);

The claims of the present invention provides an integrated system in which the electronic cross-connect (EXC) and the photonic cross-connect (PXC) cooperate to perform hybrid electronic/photonic switching of traffic. As is well known in the art, the number of protection channels is often driven by the need to provide a predetermined level of redundancy in the network. Thus, for example, some network architectures (such as BLSR) call for a 1:1 protection scheme, so as to thereby guarantee a protection fiber for every working fiber in the network. In some network architectures (e.g. Mesh networks), different protection schemes are known, some of which select the number of protection channels based on the probability failure of a working channel. As is well known, the probability of failure of an optical fiber is significantly higher (due to the risk of accidental fiber cuts) than that of an interface (which is housed within the controlled environment of a network node). Consequently, in protection schemes based on failure probabilities, the number of protection channels (or fibers) will be driven by the probability of failure of the optical fiber, rather than that of the interfaces. Accordingly, redundant interfaces must necessarily be provisioned in the same ratio as redundant channels within a link. In all cases, since every protection channel is hosted by at least one respective protection interface, the number of protection interfaces is based on the

number of protection channels. This results in greater numbers of redundant interfaces than is optimum, based on the probability of failure of each interface.

Kuroyanagi et al discloses an optical transmission system which includes an optical path cross-connect device and an electrical cross-connect device connected by working and standby input/output interface links. Optical signals in the working and standby optical paths enter the optical path cross-connect device into the electrical cross-connect device via the working and standby interface links for enabling switching of traffic between the working and standby paths. The ratio between the working and standby paths is a 1:1 ratio (See Fig. 1). Similarly the interfaces within the within the optical transmission system are provisioned in a fixed 1:1 ratio relative to the number of standby paths. Kuroyanagi et al provides for switching between a working optical transmission line and a standby optical transmission line without momentary disconnect by making phase adjustments in the standby path to match the working path. (Col 7. lines 43 to 47). Kuroyanangi does not teach or suggest determining the number of required protection interfaces based upon failure probabilities of individual protection interfaces irrespective of path failure.

Fee discloses line protection switching by embedding and ancillary network data sub-carrier modulation signal in the optical path (Col. 6 line 56 to 64). All protection switching occurs in the optical domain at a optical cross-connect switch (See Fig. 3D). Fee selects the number of protection interfaces based on the number of protection channels of 1:N where N>1, however the interfaces to the optical fiber are provided 1:1. The provisioning of interfaces in Fee is driven by network redundancy requirements of the probability of a fiber failure. There is no suggestion of provisioning electronic/photonic switching nor of optical to electrical and electrical to optical interfaces within a switching node.

In contrast, the present invention provides for optimizing hybrid electronic/photonic switching wherein hardware resources are optimized by selecting the <u>number of protection interfaces based on a</u> <u>probability of failure of each provisioned working interface</u> as defined by the subject matter of claim 1. Provisioning switching hardware in this manner reduces the cost of provisioning the required number of interfaces which typically constitutes the single largest component of the capital cost of deploying a modern fiber communications network. The ratio of optical fiber to interfaces is not 1:1 as disclosed in Kuroyanagi et al or Fee but provisioned

based upon the probability of failure of the individual interfaces. The fiber to interface ratio is then a varying ratio dependent on the hardware used not fiber failure rates. The architecture of the hybrid electronic/photonic switch is provisioned and optimized based upon failure probabilities of the specific hardware utilized. The prior art in this field does not discuss the aspect of provisioning interfaces of the switch based upon probabilities of failure and none of the technical standards used by a person of skill in the art during provision of a hybrid photonic/electronic switching architecture, let alone a traditional photonic switch, disclose this concept. As described above, Kuroyanagi et al. and Fee do not teach or suggest this feature.

Accordingly, it is submitted that Kuroyanagi et al. and Fee fail to teach or suggest the combination of elements of claim 1, and therefore claim 1 and the dependent claims are patentable over the teachings of Kuroyanagi et al (US Patent No. 6,072,610) in view of Fee (US Patent No. 6,108,113). In light of the foregoing, it is respectfully submitted that the subject matter of claims 1, 3-6, and 10-12 is clearly distinguishable over the teaching of Kuroyanagi et al (US Patent No. 6,072,610) in view of Fee (US Patent No. 6,108,113).

As the subject matter of claims claims 7, 8, 13 and 14 are dependent on claim 1, they are clearly patentable over Kuroyanagi et al (US Patent No. 6,072,610) in view of Fee (US Patent No. 6,108,113) and further in view of Yin et al. (US Patent No. 6,246,747) for the same reasons as discussed above. Yin et al fails to provide the missing teachings to render Claim 1 obvious as Yin discloses a tunable laser only. Thus it is believed that the present application is in condition for allowance, and early action in that respect is courteously solicited.

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Respectfully submitted,

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